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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Nigamananda Samal

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EXAMINER

NGUYEN, PHILLIP

ART UNIT

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/592,999	<b>Applicant(s)</b> SAMAL ET AL.	
	<b>Examiner</b> PHILLIP NGUYEN	<b>Art Unit</b> 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/7/07</u> .  | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 1 is objected to because of the following informalities: In line 5, read as "the apertures being sizes and distances from a center of the active region" which should be rewritten such as --the apertures being sized and distanced from a center of the active region--.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11 and 15-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 recites in line 3 "a first oxide aperture" and line 4 "a second oxide aperture" which is not clear and confusing. The apertures are not oxidized. Only the outer region of the layer having apertures are oxidized thereof becoming current blocking region. The apertures are current flowing regions.

Claims 15-16 recite "a via into the substrate and into proximity with one of said mirror stack" which is not clear what applicant intends to claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Ueki (US 6636542).

With respect to claim 1, Ueki discloses in Fig. 2(b) a semiconductor laser device including:

a first oxide layer 21a defining a first aperture 22a;

a second oxide layer 21b defining a second aperture 22b; and

an active region 16 located between the apertures;

Since the apertures being “sizes and distances” from the center of the active region 16 the way that is shown in the specification of the instant application, it’s believed that the laser is capable to induce a near-Gaussian shape of spatial current density distribution.

With respect to claim 11, see the rejection of claim 1. Ueki further teaches a first stack of mirror pairs 12 on one side of the active region 16 and a second stack of mirror pair 24 on a second side of the active region 16; the improvement comprising a first oxide aperture 21a of a

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first size on the one side of the active region at a first distance from the center of the active region and a second oxide aperture 22b of a second size on the second side of the active region 16 at a second distance from the center of the active region. It's noted that the claim fails to limit if the first and second aperture sizes and distances being different from each other.

With respect to claim 17, Ueki discloses a heatsink 28 or 29 supporting the active region 16 and the first and second mirror stacks 12 and 24, the electrode extending into heat conducting relation into one of the mirror stacks.

Claims 1-3, 8, 11-13, and 17-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Uchiyama et al. (US 20030007528).

With respect to claim 1, Uchiyama discloses in Figs. 2-5 a semiconductor laser device including:

- a first oxide layer 50 defining a first aperture 48;
- a second oxide layer 64 defining a second aperture 62; and
- an active region 54 located between the apertures;

Since the apertures being "sizes and distances" from the center of the active region 54 the way that is shown in the specification of the instant application, it's believed that the laser is capable to induce a near-Gaussian shape of spatial current density distribution.

With respect to claim 2, Uchiyama discloses a p-mirror 46 on one side of the active region 54 and an n-mirror 58 on another side of the active region 16, and wherein the first oxide layer is p-mirror oxide layer and the second oxide layer is an n-mirror oxide layer.

With respect to claims 3, Uchiyama discloses the first and second oxide layers (50 and 64) and the first and second apertures (48 and 62) defined differ in distance from the center of the active region.

With respect to claim 8, Uchiyama discloses wherein the first aperture 48 is substantially 3 to 20 microns across (15 microns, paragraph 0034) and the second aperture is substantially 5 to 30 microns across (10 microns, paragraph 0036).

With respect to claim 11, Uchiyama illustrates in Fig. 2 a VCSEL having an active region 54, a first stack of mirror pairs 58 on one side of the active region 54 and a second stack of mirror pair 46 on a second side of the active region 54; the improvement comprising a first oxide aperture 62 of a first size on the one side of the active region at a first distance from the center of the active region and a second oxide aperture 48 of a second size on the second side of the active region 54 at a second distance from the center of the active region.

With respect to claim 12, Uchiyama discloses the first and second oxide layers (64 and 50) and the first and second apertures (62 and 48) defined differ in distance from the center of the active region.

With respect to claim 13, Uchiyama discloses the first aperture size is smaller than the second aperture size and the first distance is greater than the second distance (see Fig. 2).

With respect to claims 17-18, Uchiyama discloses a heatsink 26 or 68 supporting the active region 16 and the first and second mirror stacks 12 and 24, the electrode extending into heat conducting relation into one of the mirror stacks.

3. Claims 1-2 are rejected under 35 U.S.C. 102(b) as being anticipated by Hu et al. (US 6658040).

With respect to claim 1, Hu discloses in 7A a semiconductor laser device including:  
a first oxide layer (one of the oxide layers of 708 defining a first aperture (between the oxide region);  
a second oxide layer (one of the oxide layers of 706) defining a second aperture (between the oxide region); and  
an active region 205 located between the apertures;

Since the apertures being “sizes and distances” from the center of the active region 205 the way that is shown in the specification of the instant application, it’s believed that the laser is capable to induce a near-Gaussian shape of spatial current density distribution.

With respect to claim 2, Hu discloses a p-mirror 46 on one side of the active region 54 and an n-mirror 58 on another side of the active region 16, and wherein the first oxide layer is p-mirror oxide layer and the second oxide layer is an n-mirror oxide layer.

4. Claims 1-3 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Choquette et al. (US 7085301).

With respect to claim 1, Choquette discloses in Figs. 1-3 the claimed invention wherein a semiconductor laser device including:

a first oxide layer defining a first aperture (the central area that is not oxidized in the upper mirror 20);

a second oxide layer defining a second aperture (the central area that is not oxidized in the lower mirror 18); and

an active region 22 located between the apertures;

Since the apertures being “sizes and distances” from the center of the active region 22 the way that is shown in the specification of the instant application, it’s believed that the laser is capable to induce a near-Gaussian shape of spatial current density distribution.

With respect to claim 2, although Choquette does not explicitly disclose which mirror has p-type conduction or n-type conduction, it is believed that either mirror will be n or p type. Therefore it is not critical to distinguish upper or lower mirror to be n-type or p-type.

With respect to claim 11, Choquette illustrates in Figs. 1-3 a VCSEL having an active region 22, a first stack of mirror pairs 20 on one side of the active region 22 and a second stack of mirror pair 18 on a second side of the active region 22; the improvement comprising a first oxide aperture (the central area that is not oxidized in the upper mirror 20) of a first size on the one side of the active region at a first distance from the center of the active region and a second oxide aperture (the central area that is not oxidized in the lower mirror 18) of a second size on the second side of the active region 22 at a second distance from the center of the active region.



***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4, 7, 10, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choquette et al. (US 7085301).

With respect to claims 4 and 13, Choquette discloses in Figs. 1-3 the claimed invention except for explicitly teaching the size of the first aperture being smaller than the size of the second aperture. However, one skilled in the art would obviously observe that the claim fails to define how much the second aperture is smaller than the that of the first aperture. If the difference is small enough, the laser output might not be affected. Therefore, it is believed that even though the sizes might be different but the output might not be different due to the negligible difference in sizes between the apertures. See MPEP 2131.03[R-6].

With respect to claims 7, 10 and 14, Choquette discloses in Figs. 1-3 the apertures being formed extending into a few pairs of both mirror stacks. Choquette further discloses the apertures size being substantially 5-30 microns (col. 7, lines 60-67). It would have been obvious to one skilled in the art at the time the invention was made to realize the apertures are spaced between 1 to 20 mirror pairs from the center of the active region.

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchiyama et al. (US 20030007528) in view of Lo (US 5491710).

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Uchiyama discloses the claimed invention and further a substrate 42 upon which the active region and first and second mirror stacks are grown, and heat conductive plating 68 except for a via "into" the substrate and "into" proximity with one of said mirror stacks and the heat conductive plating extending from an outer surface into the via.

Lo discloses a VCSEL shown in Figs. 4 and 5 and further a via 28 "into" a substrate 12 and "into" proximity with one of said mirror stacks and the heat conductive plating extending from an outer surface into the via. It's noted that the mirror 28 is a metal mirror which is considered as [a] heat plating.

It would have been obvious to one skill in the art at the time the invention was made to provide the via and heat conductive plating as disclosed by Lo in order to remove heat from the laser more effectively in order to stabilize the output of the VCSEL.

### ***Communication Information***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip Nguyen whose telephone number is 571-272-1947. The examiner can normally be reached on 9:00 AM - 6:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MINSUN HARVEY, can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Phillip Nguyen/

AU 2828

/Minsun Harvey/  
Supervisory Patent Examiner, Art Unit 2828